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THE CHICAGO MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Edited by Dr. F. R. MOULTON

PERMANENT SECRETARY

FROM September 22 to September 27, inclusive, the American Association for the Advancement of Science had the pleasure of participating in the Fiftieth Anniversary Celebration of The University of Chicago. This was the one hundred ninth meeting of the association and its fifth meeting in Chicago, earlier meetings having been held in that city in 1868, 1908, 1920 and 1933. The program of the meeting consisted largely of the "Fiftieth Anniversary Symposia" on "New Frontiers in Education and Research" which were organized by the university. However, the Section on Medical Sciences (N) presented a very comprehensive and distinguished symposium on "Aerobiology," which had been in preparation for more than a year. There were, in addition, twelve special lectures by distinguished scholars, on many of whom honorary degrees were conferred at the convocation of the university held on September 29.[1]

Although at the time of the Chicago meeting most universities had already entered on the work of the current academic year, the attendance was gratifying and the participants were distinguished. About 2,000 persons were registered, and probably many others attended one or more of the sessions without registering. In quality, the meeting was worthy of a great

[1] SCIENCE, October 3, p. 321.

university. The fine buildings provided ample accommodations and the arrangements for the convenience of visitors were excellent. Nearly all the contributors to the programs submitted copies of their addresses far enough in advance to permit their being mimeographed for the use of representatives of the press, who were assigned commodious quarters in Mitchell Tower. To those who remembered the debris-littered grounds of earlier days the green, well-kept campus was a delight. In its maturity the university has taken on the genteel mellowness characteristic of all famous seats of learning, but it has lost much of the crusading spirit that for a generation led the Middle West and the South into a myriad of new educational adventures.

The date of the celebration was so late that several affiliated societies of the association were compelled for various reasons to hold their meetings earlier. The American Mathematical Society, the Mathematical Association of America, the Institute of Mathematical Physics and the Econometric Society held meetings at the university during the week beginning on September 1. On September 7–9 the American Astronomical Society held its annual meeting at the Yerkes Observatory, following which the astronomers held a three-day symposium on "Astronomical Spectra."

Special Lectures

On September 3, 4 and 5, Professor Oystein Ore, of Yale University, delivered the twenty-third colloquium lectures of the American Mathematical Society on "Mathematical Relations and Structures." It is expected that the society will publish these lectures.

On the evening of September 3 the sixteenth Josiah Willard Gibbs lecture was delivered by Sewall Wright, The University of Chicago, on "Statistical Genetics and Evolution."

On Monday, September 22, Herald R. Cox, Rocky Mountain Laboratory, U. S. Public Health Service, recipient of the Theobald Smith Award in Medical Sciences of the A.A.A.S. for 1941, delivered an address on "Cultivation of Rickettsiae of the Rocky Mountain Spotted Fever, Typhus and Q Fever Groups in the Embryonic Tissues of Developing Chicks." The award consists of one thousand dollars and a bronze medal furnished by Eli Lilly and Company. In his address Dr. Cox explained his important method of producing vaccines for a group of very serious diseases by inoculating fertile eggs of hens with their causative viruses. His method is relatively simple, inexpensive and is adaptable to quantity production.

In his introductory remarks, Dr. Langmuir, president of the association, alluded to the coincidence that Dr. Cox was awarded a prize for his development of a vaccine for rickettsial diseases, which were named after Dr. Howard Ricketts, a former member of the faculty of The University of Chicago, who discovered their causative agents. He recalled the fact that Dr. Ricketts died of the disease following an accidental infection while studying it in Mexico City in 1910.

On Monday, September 22, Robert R. Williams, chemical director, the Bell Telephone Laboratories, delivered an address on "The Social Implications of Vitamins."

On Tuesday, September 23, Donald Dexter Van Slyke, chief chemist, The Rockefeller Foundation for Medical Research, lectured on "The Physiology of Amino Acids."

On Wednesday, September 24, Lydia J. Roberts, chairman of the Department of Home Economics, The University of Chicago, delivered a lecture on "Textile Research in the Interest of the Consumer."

On Thursday, September 25, Florence Barbara Seibert, professor of biochemistry, The Henry Phipps Institute, University of Pennsylvania, delivered an address on "Tuberculosis as the Chemist Sees It."

On Thursday, September 25, Isabel Maitland Stewart, professor of nursing education, Teachers College, Columbia University, delivered a lecture on "Advancing Frontiers in Nursing Education."

On Thursday, September 25, Halvdan Koht, formerly professor of history, Royal Frederick University, Oslo, and formerly Secretary of State of Norway, delivered a lecture on "The Historical Interpretation of Art and Literature."

On Thursday, September 25, Reginald Aldworth Daly, Sturgis-Hooper professor of geology, Harvard University, delivered an address on "Glaciation and Submarine Valleys."

On Friday, September 26, Charles Herbert Best, professor of physiology, University of Toronto, delivered an address on "The Significance of Choline as a Dietary Factor."

On Friday, September 26, Ernest William Goodpasture, professor of pathology, Vanderbilt University, and vice-president of the A.A.A.S. for the Section on Medical Sciences (N), delivered an address on "Virus Infection of the Mammalian Foetus."

Symposia

Thirty-three symposia were presented on a wide variety of subjects, ranging from pure mathematics to the place of ethics in social science. The titles of nearly all of them and the names of the contributors to them were listed in the August 15 issue of SCIENCE. An exception was an extensive symposium on Aerobiology, which was presented at five sessions and which consisted of thirty-seven papers.

The symposium on Aerobiology was organized by the Section on the Medical Sciences, of which Dr.

Malcolm H. Soule is secretary, in cooperation with the Committee on Aerobiology of the National Research Council. Dr. E. C. Stakman was largely responsible for organizing the part of the symposium on extramural aerobiology and Dr. Stuart Mudd for the part on intramural biology.

The first session was devoted to eight papers on extramural aerobiology. Such subjects were discussed as "Air-borne Pollens as Allergens," "Air-borne Fungus Spores as Allergens" and "Long Distance Dissemination of Plant Pathogens."

The remainder of the program, consisting of twenty-nine papers, was devoted to problems of intramural aerobiology, including such subjects as "Air-borne Infection as a Basis for a Theory of Contagion" and "Disinfection of Air by Air-conditioning Processes." The third session was devoted entirely to papers on various aspects of "The Germicidal Action of Ultra-violet Light." The fourth and fifth sessions continued with reports of experiments, and of experiences in hospitals and other institutions, on the control of respiratory contagions by the use of ultra-violet radiation and other means.

It is expected that the symposium on Aerobiology will be published by the association.

A symposium on "Life at High Altitudes and Aviation Medicine" attracted special attention because two of its papers combined important scientific problems with matters of human interest. Professor Carlos Monge, of Lima, Peru, read a paper on "Life upon the Andes and Chronic Mountain Sickness," in which he discussed the effects of seasonal migrations from high plateaus to low levels, a change resulting in a reduction of atmospheric pressure by as much as 40 per cent. Naturally the radical change in important factors of the environment calls for corresponding physiological adjustments which Dr. Monge had investigated. For example, he reported on experiments on the reproductive capacity of various domestic animals when transported to high altitudes. In spite of the fact that domestic animals taken to high altitudes failed to reproduce themselves, the native inhabitants, both human and animal, at the same altitudes have the same birth rates as in low altitudes. It is reported that the Spanish Conquerors had no offspring until fifty years after they founded Potosi, at an altitude of 14,000 feet.

In a paper on "The Physiology of a Free Flight through the Air," Dr. A. C. Ivy and his associates reported on free falls from airplanes by A. H. Starnes through distances ranging from 8,400 feet to 16,500 feet before the opening of his parachute. With the aid of a large amount of auxiliary apparatus carried by Mr. Starnes in his leaps records were secured of the physiological and psychological effects on the parachutist. The apparatus for determining the orientation of the subject showed that he often gyrated or tumbled rapidly before his parachute opened. The experiments showed that during the period of free fall he suffered no appreciable unfavorable effects on heart rate, blood pressure, vision, hearing or mental alertness. The greatest falling speed attained in a drop of 16,500 feet was 158 miles per hour, appreciably below the flying speed of transport planes and much below the speed of combat planes. Consequently the shock on the jumper when the parachute opens is reduced by delaying its opening, and the danger of becoming entangled with his plane and from enemy fire is also reduced.

Surface chemistry has recently become a subject of great interest to both chemists and biologists—to the former, because in this field chemists deal with the chemical properties of matter under the relatively simple conditions when it is in layers one molecule or a few molecules thick; to the latter, because on a knowledge of the properties of the surface layers of living cells depends the understanding of many of the most important life processes. Primarily for this reason a symposium on "Surface Chemistry" was organized. A second reason for its organization was the fact that Dr. W. D. Harkins, of the University of Chicago, was a pioneer in this field and the program was partly in his honor. The symposium, consisting of eleven papers, was presented at three sessions. One of the contributors to it was Dr. Irving Langmuir, president of the association. It is expected that the association will publish this symposium.

Meeting of the Executive Committee

On September 21, the day before the beginning of the programs of the meeting, the executive committee held an all-day session. Most of its actions were in the nature of recommendations to be presented to the council at the annual meeting, which will begin on December 29 in Dallas, Texas. There were, however, a few that from their nature were immediately effective.

1. Dr. Lewis H. Weed and Dr. Edward Harvey Cushing were appointed representatives of the association at a meeting of the Division for the Social and International Relations of Science of the British Association for the Advancement of Science, which was held in London from September 26 to 28, 1941. J. G. Winant, Ambassador from the United States to Great Britain, was chairman of the session for discussions of "Science and Human Needs."

2. The Permanent Secretary was authorized to send a cable of greetings to the divisional meeting of the British Association.

3. Dr. Raymond J. Seeger, of George Washington University, Washington, D. C., was elected secretary of the Section on Historical and Philological Sciences to succeed Dr. C. A. Browne, resigned, for the term which will expire at the close of the annual meeting in December–January, 1944–45.

4. It was voted to accept the invitation from the University of Michigan to hold a meeting in Ann Arbor, June 22–26, 1942.

5. It was voted to meet in Atlantic City in December, 1944, and in St. Louis in December, 1945, provided satisfactory arrangements for the meetings can be made.

6. The executive committee considered with favor the suggestion that, provided satisfactory arrangements can be made, summer meetings be held as follows: New Haven, 1943; Madison, 1944; Chapel Hill-Durham, 1945; Toronto, 1946.

ORIGIN AND IDEALS OF THE NATIONAL SCIENCE FUND[1]

By Dr. ALBERT F. BLAKESLEE

CARNEGIE INSTITUTION OF WASHINGTON, DEPARTMENT OF GENETICS, COLD SPRING HARBOR, N. Y.

I HAVE been asked to say a few words about how the idea of a national science fund got started and what the committee has done which was appointed to study the desirability of establishing such a fund. It should be emphasized at the start that no one person originates an idea entirely alone; there are always others who contribute. Although I happened to be the one who suggested a national fund for science along the lines of our present organization I was merely expressing what seemed a logical need from a background of the experience of many. Perhaps the most important contributing event was the two-day symposium organized by the American Philosophical Society on February 19 and 20, 1937, on "Administering Funds in Aid of Research" in which I was privileged to take part as a delegate of the Carnegie Institution of Washington. The late Dr. E. M. East, who also attended the symposium, visited us on his way back to Harvard. We naturally talked over the problems which had been raised in the meeting and he told of his experience as chairman of a committee of the American Academy of Arts and Sciences on their "Permanent Science Fund." The name fascinated me and later I began to wonder if there could not be established a fund which would be more national in character and which might perform a service not adequately cared for by any organization. In our discussions with East we had lamented the fact that those who make donations in support of science so frequently fail to investigate the likelihood of scientific dividends from their donations, although they might exercise great care when financial dividends were involved. An example of unwise generosity was presented at about this time when a local estate was offered as a clinic for a particular method of cancer treatment which later was found unable to stand up under critical tests of the medical profession.

The fund I had in mind might be of service, I felt, to possible philanthropists in preventing such an example as that just given and serve as a clearing-house of information on philanthropic investments in science. I tried the idea out on a number of people, including a friend in the Central Hanover Bank and Trust Company, who turned me over to their department of philanthropy. They seemed to think the idea had possibilities of service and showed me two booklets they had just gotten out giving the opportunities for philanthropy in the fine arts and in public health. They believed there was an opportunity for similar service in pointing out the opportunities for philanthropy in science. When told of the various scientific organizations in the country, both state and national, that might organize such a fund, they felt that the National Academy of Sciences would be the best because of its national character and its select membership. The pamphlets from the Central Hanover Bank and Trust Company, together with other information and suggestions which I had assembled regarding a possible national science fund, were turned over to Dr. Lillie, as president of the National Academy of Sciences, at the spring meeting of the academy in 1937. Later in the year I woke up to find myself a member of a committee of the academy to investigate the feasibility of a national science fund.

It soon became evident that our committee was not

[1] Remarks at first meeting of Board of Directors of National Science Fund at University Club, New York City, May 21, 1941. The newly appointed Directors of the Fund are: R. Adams, W. W. Aldrich, *Vice Chairman*, J. R. Angell, J. F. Bell, A. F. Blakeslee, I. Bowman, A. H. Compton, J. B. Conant, E. G. Conklin, J. W. Davis, L. P. Eisenhart, H. L. Ferguson, H. S. Gasser, W. S. Gifford, C. J. H. Hayes, H. Hoover, E. O. Lawrence, F. R. Lillie, R. A. Millikan, A. MacLeish, H. S. Mudd, A. N. Richards, W. J. Robbins, *Chairman*, E. Root, Jr., H. Shapley, T. K. Smith, L. L. Strauss, H. H. Swift, G. H. Whipple. *Ex officio:* The President, National Academy of Sciences, F. B. Jewett; The Treasurer, National Academy of Sciences, J. C. Hunsaker, *treasurer;* The Charman, National Research Council, R. G. Harrison; The President, American Association for the Advancement of Science, I. Langmuir; H. H. Sargeant, *Executive Secretary.*

interested in any intensive drive for money in support of research but rather in the establishment of a fund on such a basis that through the years it would be of service both to philanthropists who wished to make investments in promotion of scientific discoveries and to those capable of carrying on research. Through grants from the Carnegie Corporation it has been possible to secure the services of an executive officer, Mr. H. H. Sargeant, who has made a thorough study of the whole field of endowments in this country and the place that might be filled by a national science fund. It comes out very clearly that since the depression began the financial support of fundamental research has been decreasing, especially in the universities. With the war abroad and the defense program in this country fundamental research has suffered still more. A successful national science fund which could preserve and advance fundamental research would seem especially needed therefore at the present time.

Little need be said about the activities of the committee on organization since our recommendations are incorporated in the constitution of the new National Science Fund. I should like, however, to say a few words regarding what I believe should be the ideals of the National Science Fund.

The original idea of the fund was not a scheme to raise money for a particular group, *i.e.*, the scientists, but rather to offer service that was not adequately cared for. I believe this ideal of service should be at the basis of all the fund's activities. This service can be considered in three main aspects: (1) service to donors; (2) service to scientists; and (3) service to humanity.

(1) *Service to Donors:* In stressing the service which it may render to donors, the fund may become rather a unique organization. Gifts to science, as any other philanthropies for the promotion of human welfare, should be considered as investments. The National Science Fund may become a clearing-house for advice on the probable scientific dividends which may be expected from investments in science. For such advice the National Science Fund has available the members of the National Academy of Sciences and can call upon the membership of the two closely associated organizations, the National Research Council and the American Association for the Advancement of Science each of which is represented *ex officio* on our board of directors. For donors who wish to have this done, the National Science Fund is in position to receive donations and administer funds in support of science. The character especially of the lay members of the fund should assure the financial integrity of such funds and the character especially of the scientific members should assure a scientifically profitable use of such funds. Donations to the National Science Fund should become named funds with some such title as the "John Doe Science Investment" and should be enduring memorials with continuing service. This opportunity should be open to those donors who have only small amounts to give to science as well as to the benefactors of larger means who wish to put their benefactions where their administration will continue to have the best scientific advice humanly procurable.

(2) *Service to Scientists:* While the first service may be to the donor in guiding him in his efforts to promote the welfare of mankind through the advancement of science, the National Science Fund can be of direct service to scientists. Grants committees and endowments for the promotion of science depend too largely upon applications for grants in their allotments in support of science. This is the easiest way. I believe the National Science Fund can be most successful in increasing the yield of scientific dividends from the funds at its disposal if it seeks out the skilled investigator rather than making grants solely to those who apply. Such a scheme would tend toward the more just award of real merit. Men differ greatly in their capacities for research. A great problem in the advancement of science is how to devise a scheme for discovering the exceptional abilities at an early age and giving men with such abilities exceptional opportunities for the expression of their talents. The National Science Fund can act as a clearing-house for exceptional ability among scientists as well as for advice to donors.

(3) *Service to humanity:* The interest of philanthropists is probably not in science as an end in itself but rather in the promotion of human welfare through the advancement of science. Much could be said of the material benefits brought about by science in the way of human comforts, alleviation of suffering and the rise in the standard of living from the applications of scientific discoveries. Modern civilization is truly the product of science. Though it has brought us material comforts, its greatest gift is an unshackling of the human mind from the bondage of ignorance and superstition. It is the increased knowledge of the world in which we live and the spiritual values of science that should be emphasized. Like art, music and literature, science nourishes the spirit. A wholly new world would be born if the ideals of science should become universal. The National Science Fund may help to spread the methods of science more widely and to help society reach judgments on the basis of ascertained fact rather than through emotional appeal and personal profit. There is a service which science has to offer to society and it is in relation to this service

in large measure that the lay members of our board have been chosen. They are in better position to judge regarding the incidence of science upon human welfare than the scientific members of the board, who are perhaps too closely involved in scientific activities.

I have all confidence that in the years to come the National Science Fund will fulfil a needed service both to those of philanthropic intent and to the scientists, and through these two groups to the welfare of mankind.

OBITUARY

CHARLES BRANCH WILSON

October 20, 1861–August 18, 1941

THE unexpected, yet quiet passing of Dr. Charles Branch Wilson, of Westfield, Massachusetts, in the early hours of the eighteenth of August was a profound shock to all of us who knew him personally and a grievous loss to the science of marine biology that we shall probably not see made good in our lifetime, and perhaps not in several lifetimes to come.

In his comprehensive knowledge of the free-swimming marine and parasitic copepods, which comprised his more specialized field of study, Dr. Wilson was without a peer. He was one of the last of that outstanding, more or less contemporary group of the great monographers of the marine copepods which included such famous men as George Stewart Brady, James Dwight Dana, Wilhelm Giesbrecht, George Ossian Sars and Thomas and Andrew Scott (father and son, respectively).

From 1896 to 1932 Dr. Wilson was head of the science department of the State Teachers College at Westfield, where he carried on many of his researches. It is to the everlasting credit of the college and those connected with its administration that he was permitted to continue in his laboratory there from the time of his retirement in 1932 until his death. Without those congenial and studious surroundings of which he was so intimate a part perhaps the three great works of his later, retired years, still in manuscript form, but complete and now awaiting publication at the U. S. National Museum and the Carnegie Institution of Washington, might never have been accomplished.

The first of these manuscripts, and perhaps the most important in Dr. Wilson's own opinion, deals with the copepods of the marine plankton taken on the last cruise of the ill-fated non-magnetic yacht, *Carnegie*. This report, which was submitted for publication several years ago, for the first time in the history of oceanography gives the directly comparable results of simultaneous three-level tows made in all oceans with identical gear, accompanied by full station data, including temperature, salinity, density, phosphates and hydrogen ion concentration. In his painstaking tabulation of the species of copepods in every haul and their abundance at each of the three levels investigated, involving the microscopic inspection of many thousands of individual copepods, Dr. Wilson has made available a biologic record of a group of organisms of highest importance in the economy of the seas such as has never been achieved by any marine expedition.

The second of these manuscripts completes the study of the last remaining unidentified parasitic copepods in the national collections, describing 6 new genera and 15 new species. Through the almost unaided efforts of Dr. Wilson, the National Museum now possesses the most comprehensive collection of parasitic copepods in the world.

The third and last of these manuscripts sets forth the results of his study of the copepods of the plankton and dredged material amassed during the greater part of the useful life of the former U. S. Fisheries Steamer *Albatross*. In time this covers nearly a quarter of a century, from 1887, when the *Albatross* made her memorable passage from the Atlantic to the Pacific by way of the Straits of Magellan, to 1910, which marked the close of the three-year *Albatross* Philippine Expedition. This monumental report makes important additions to the records of distribution of 469 species of copepods, describes 32 new species, and describes the hitherto unknown opposite sex of twenty-eight.

Dr. Wilson was active to the very eve of his death. Scarcely twenty-four hours before his passing I had the great pleasure of visiting him. At that time he went over with me some of the work that he was engaged in at the moment, pointing out some of the high lights in these manuscripts and showing me his very complete notes and records of the known species of copepods and the incomparable library of copepod literature that he had built up in the course of a busy lifetime.

Just five days later it became my sad duty to represent the Smithsonian Institution at his funeral. Had I not gone to Westfield for that ceremony I might never have learned how universally well known and beloved Dr. Wilson was by all the townspeople and by all those who ever attended his classes at the college, how varied his interests, how full his life and how much he furthered, and I may say fathered, the educational and social life of the community in which he spent the greater part of his life. His service as a member of the school committee was the longest in the town's annals. He was a devoted churchman,

having given long-to-be-remembered lay sermons or lectures, and was a founder of the town's Get-together Club. He was a most able bowler and a proficient golfer in his day, and was keenly interested in basketball, baseball and, in fact, all outdoor sports. One is amazed to learn that he had time for all these things in addition to his many researches which have given Westfield and its State Teachers College an enviable reputation as a scientific center.

Nine different countries have published one or more of his scientific writings, which comprise not less than 85 titles. Besides copepods, his publications include the results of original researches on the embryology of amphibia, sipunculid and nemertean worms; life histories and economic importance of dragon-flies, damsel-flies, aquatic hemiptera and coleoptera, and freshwater mussels; as well as the results of various biological surveys made chiefly by the U. S. Bureau of Fisheries (now Fish and Wildlife Service) and several school texts and outlines.

Never hurried, he accomplished a prodigious amount of work, and all of it showed evidence of most meticulous care. His manuscripts required as little editorial attention as any ever to be submitted to the National Museum for publication. In this connection, Dr. S. F. Hildebrand recalls an incident at the time when Dr. Robert C. Coker was director of the U. S. Fisheries Station at Fairport, Iowa. On receipt of a manuscript from Dr. Wilson, Dr. Coker called the staff together, in order to show them the manuscript as an example of how a report should be written and how a manuscript should be prepared for publication, so well and beautifully was it done.

Dr. Wilson was one of the most valued scientific collaborators on the rolls of the National Museum. He bequeathed to the museum his library of copepod literature, which is perhaps the most complete of its kind in the world, together with his correspondingly complete card catalogue of copepod names in literature and references to the species dealt with by each author represented in his library.

WALDO L. SCHMITT
U. S. NATIONAL MUSEUM

SCIENTIFIC EVENTS

CHEMICAL RESEARCH ACTIVITY

A DECREASE of twelve per cent. in the world's recorded chemical research activity for the first half of 1941 as compared with the first half of 1940 is reported by Professor E. J. Crane, of the Ohio State University, editor of *Chemical Abstracts*, to the American Chemical Society.

The United States produces even in peacetime more than a quarter of the world's output of scientific and technical papers announcing new chemical information. It has as yet shown no noticeable decrease in the publication of the results of research for peacetime purposes.

Although the effects of the present warfare between Germany and the Soviet Republic are not reflected in the figures, the U.S.S.R., like the United States, up to the present has more than held its own. The British and German scientific and technical periodicals, in which a good many chemical papers of the peaceful-purpose type are still being published, average about half their regular size with rather wide variation among individual journals.

Abstracts gathered by systematic examination of more than 3,500 scientific, technical or trade journals published in thirty-one languages and obtained from all corners of the earth, and of the patent literature, number approximately 65,000 in a normal year. The twelve per cent. decrease in the past year may be compared with a drop of ten per cent. in abstracts of papers published in 1940 from the number for 1939. Professor Crane points out:

> The reporting of research activity naturally lags behind performance so that war effects will no doubt become increasingly evident. Even so, a decrease of not more than one fifth in peaceful chemical research activity the world over can be safely predicted for war-torn 1941 from the output of the virtually peaceful year 1939. Is that not somewhat surprising?
>
> There has probably not been a great deal of falling off in chemical research considered on the basis of total accomplishment the world over. In such conquered spots as France and Poland there is little or no opportunity or incentive for research. On the other hand, research activity conducted for national purposes and not reflected by publication is obviously in high gear in the countries still at war and in those preparing for the possibility of warfare.
>
> Wide-awake nations recognize the value of their scientific men and they are not putting them in the field. Even so, so-called "all-out" warfare and preparedness, with so many important nations involved, has come very far from killing off chemical research for peaceful purposes. American scientific periodicals remain "fat." Paper shortage is no doubt a factor in the reduction of European journals.

ALASKAN EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY

DR. HARRY L. SHAPIRO, associate curator of physical anthropology of the American Museum of Natural History, has returned after working during the summer at Point Hope, Alaska.

Further light has been thrown on the discoveries made in 1939 and 1940 by an American Museum-University of Alaska expedition under the direction of Dr. Froelich G. Rainey, which found remains of a prehistoric town on the ancient migration route from Asia to America. Differences in the color of the vegetation disclosed five long avenues of some 600 buried dwellings that probably housed 3,000 people on the barren gravel spit of Point Hope, 130 miles above the Arctic Circle. Subsequent excavations in the graves that led out from the town site uncovered remains and implements very different from those of the prehistoric and present-day Eskimo tribes of that region. This ancient culture has been labeled "Ipiutak" from the Eskimo name of a small spit of land near the site.

In log-walled tombs, constructed in rectangular shape, well-preserved skeletons were found with their implements. Skulls were equipped with large ivory eyeballs, inlaid with jet pupils, and fantastic ivory carvings evidently used for decoration. The graves also contained many arrowheads, fine flint tools, needles and other artifacts of daily living. The carvings and implements made by these people were sufficiently different from the known Eskimo cultures to encourage further search to trace its origin.

Dr. Shapiro collected skeletal remains of the Ipiutaks as well as of the more recent Eskimo tribes and studied the living populations of Point Hope and the interior in order to determine the relationship of the ancient Ipiutak people to their successors. Another site excavated was at Tigara, a village very near the ancient Ipiutak town, now inhabited by modern Eskimos who live by hunting whales, seals and other sea mammals. Excavations at Tigara showed that it had been occupied since the abandonment of the Ipiutak site, roughly about 2,000 years ago. The Ipiutak culture is especially distinguished by a unique ivory art, an abundance of finely chipped flat tools and by an emphasis on land hunting gear. Many implements widely distributed among all previously known Eskimo people are absent. Moreover, in certain respects the Ipiutak culture, although the oldest in the area, is more complex and developed.

Dr. Shapiro made one of the largest collections of skeletal remains from any site in the New World, comprising 500 skeletons and covering more than 2,000 years of occupation in the Point Hope region. The results of months of laboratory work in measuring and comparing the remains from all these sites will determine the relationship of the Ipiutaks in the history of human migration from Asia to the North American continent.

Five hundred tombs were excavated by the expedition in an area covering an extent of six miles leading out from the Ipiutak town. The great number of artifacts recently found will be added to the collection made last year. One of the most interesting discoveries is a carved ivory mask made in several sections, with the inset ivory eyes which are peculiar to the Ipiutak burials. The mask was found in a tomb enclosing the remains of a man, a woman and a child. The body of the child was resting on the knees of the man and the huge ivory mask covered the body of the child. The significance of this and other Ipiutak burials is unknown.

THE ENGINEERS' DEFENSE BOARD

IN view of the existing national emergency, six national engineering societies have joined to organize the Engineers' Defense Board in order to provide a central agency that will be prepared to assist the various branches of the government with engineering knowledge and experience on questions connected with military preparedness. Among the functions of this organization will be:

To serve as a channel to inform engineers generally regarding defense problems, especially those involving shortages of materials.

To implement and make applicable reports and recommendations of the advisory committees of the National Academy of Sciences.

To urge engineers (a) to adopt procedures looking toward accomplishment of the objective of defense agencies; (b) to promote means of increasing production of raw materials in which shortages exist; (c) to conserve the supply of industrial materials; (d) to find substitutes, and (e) to simplify operations and production.

To act as a clearing house between engineers or engineering groups of information regarding substitute materials, waste prevention and conservation.

To appoint, on request of the Army, Navy or other defense agency, special committees of engineers to deal with specific engineering problems related to defense.

To select problems or projects dealing with defense and to study them with due regard to activities of existing agencies.

For the purpose of organization, the Engineers' Defense Board will consist initially of five representatives from each of the following six national engineering societies (American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, Society of Automotive Engineers and American Institute of Chemical Engineers) such representatives to be appointed by the governing bodies of such societies. To these may be added one or more representatives of such other national engineering societies as may be invited to participate by the Executive Committee of the Engineers' Defense Board, such representatives to be designated by the governing body of their re-

spective society; and such additional representatives of the six "organizing" societies as may be requested by the Executive Committee of the Engineers' Defense Board.

The activities of the Engineers' Defense Board will be administered by an Executive Committee consisting of (a) a chairman, a vice-chairman and a secretary, elected by the other members of the Executive Committee and (b) one representative of each of the six societies heretofore named, appointed by the governing body of their respective societies. The officers need not be representatives of any of the participating societies.

THE MONTHLY SCIENCE NEWS OF THE BRITISH COUNCIL

THE British Council has formed a Science Committee under the chairmanship of Sir William Bragg, director of the Royal Institution, with the object of strengthening relations between British scientific men and those abroad, and to encourage mutual understanding of their problems and achievements.

The other members of the committee are Professor P. M. S. Blackett, the first to photograph the artificial disintegration of an atom; Professor J. D. Cockcroft, who first disintegrated atoms by machinery; Sir Robert Robinson, the eminent chemist who has contributed to the knowledge of natural coloring matters, among other groups of substances; Dr. C. F. A. Pantin, who has made studies of the movements of *Amoeba;* Sir Edward Mellanby, known for his work on vitamins A and D; Rear-Admiral Gordon Gordon-Taylor, a surgeon; Sir William Larke, a leading engineer; Sir Edward Appleton, an authority on radio waves and discoverer of new conducting layers in the higher atmosphere; Dr. A. P. M. Fleming, director of research of the Vickers Electrical Company; C. D. le Maistre, an authority on engineering standards, and Professor R. V. Southwell, a designer of aircraft structures and investigator of the theory of elasticity.

The committee has begun the publication of the *Monthly Science News* letter, giving a survey of current scientific developments under the editorship of J. G. Crowther, the secretary of the committee, science writer, author of "British Scientists of the Nineteenth Century," "The Social Relations of Science" and other books on general science.

THE CONTRIBUTION OF HARVARD UNIVERSITY TO NATIONAL DEFENSE

ACCORDING to *The Harvard Alumni Bulletin* President Conant has been spending two days a week in Washington during the summer as chairman of the National Defense Research Committee and expects to continue on approximately the same schedule during the winter. Many members of the faculty are engaged in part-time service on a variety of defense duties, and a number of others have been relieved from university duties to respond to the call of the government. A number of these, particularly from the scientific departments or the Schools of Medicine and Public Health, are engaged in laboratories in Cambridge, or elsewhere, on confidential work.

Among those on full-time duty on defense activities away from the university are: K. T. Bainbridge, associate professor of physics, Massachusetts Institute of Technology; R. H. Cole, instructor in physics, Navy Yard, Washington, D. C.; E. M. Purcell, faculty instructor in physics, Radiation Laboratory, Massachusetts Institute of Technology; T. E. Sterne, lecturer on astrophysics, 1st Lieutenant, Aberdeen Proving Ground, Maryland; J. C. Street, associate professor of physics, Massachusetts Institute of Technology; D. B. Dill, professor of industrial physiology and consulting physiologist to the Department of Hygiene, Major, Aero-Medical Research Unit, Wright Field, Dayton, Ohio; H. H. Aiken, associate professor of applied mathematics and faculty instructor in physics and communication engineering, Lieutenant Commander, U. S. N. R., Naval Mine Warfare School, Yorktown, Va.; J. P. Den Hartog, associate professor of applied mechanics; Lieutenant Commander, U. S. N. R., Bureau of Ships, Navy Department, Washington, D. C.

THE HUNDRED AND SEVENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF RUTGERS UNIVERSITY

THE hundred and seventy-fifth anniversary of the founding of Rutgers University was celebrated on October 8, 9 and 10. The celebration opened with an address by Dr. Roscoe Pound, from 1915 to 1936 dean of the Harvard Law School, who was from 1892 to 1903 director of the Nebraska Botanical Survey. He was followed by Dr. Karl T. Compton, president of the Massachusetts Institute of Technology.

A number of symposia were held in the afternoon. Dr. Vannevar Bush, president of the Carnegie Institution of Washington, and Robert W. Trullinger, of the U. S. Department of Agriculture, took part in the symposium on applied science. Governor Charles Edison was the principal speaker at the New Jersey dinner on October 9.

Dr. Hugh Stott Taylor, of Princeton University, presided on Friday when Dr. Irving Langmuir, of the General Electric Company, and Professor E. O. Lawrence, of the University of California, took part. President Clarence Dykstra, of the University of Wisconsin, made an address on Saturday.

Among the honorary degrees conferred at the anniversary convocation on October 11 were the following:

The honorary degree of Doctor of Laws: W. H. S. Demarest, president of Rutgers from 1905 to 1925; Roscoe Pound, of the Harvard Law School; Clement Clarence Williams, president of Lehigh University, and Charles Howard McIlwain, Eaton professor of the science of government, Harvard University.

The honorary degree of Doctor of Science: Irving Langmuir, The General Electric Company, Nobel Laureate in chemistry in 1932; Ernest Orlando Lawrence, director of the Radiation Laboratory, University of California, Nobel Laureate in physics in 1939, and Hugh Stott Taylor, chairman of the department of chemistry, Princeton University.

The honorary degree of Doctor of Engineering: Karl Taylor Compton, president of the Massachusetts Institute of Technology, and Robert William Trullinger, agricultural engineer in the Office of Experiment Stations, United States Department of Agriculture.

SCIENTIFIC NOTES AND NEWS

AT the annual Founder's Day convocation at Lehigh University, presided over by President C. C. Williams, the honorary degree of doctor of engineering was conferred on Henry Sylvester Jacoby, emeritus professor of bridge engineering, Cornell University; on Thomas R. Leighton, director, University of Chile School of Engineering; on J. Smith Miller, senior vice-president, Dravo Corporation of Pittsburgh; on Igor I. Sikorsky, St. Petersburg Naval College, '06, airplane designer, and on Abram F. Steckel, inventor and engineer. The honorary degree of doctor of science was conferred on Dr. Harvey E. Jordan, dean of the University of Virginia Medical School, and the honorary degree of doctor of laws on Roland G. D. Richardson, dean of the Brown University Graduate School. The ceremonies marked the opening of the exercises celebrating the seventy-fifth anniversary of the university.

MRS. PAUL EHRLICH, widow of the great German pathologist, was presented with a $1,000 check at a dinner held in commemoration of the thirtieth anniversary of the discovery of salvarsan. The dinner was held by the American Social Hygiene Association at the Waldorf-Astoria, New York, on October 11, two months after the arrival of Mrs. Ehrlich as a refugee from Germany. Dr. Thomas Parran, Surgeon-General of the United States Public Health Service, said at the dinner: "Dr. Ehrlich's many contributions to the advancement of medicine placed him with Pasteur, Lister and Koch among the immortals of medicine."

A DINNER in honor of Dr. Eugene F. DuBois, head of the department of physiology and biophysics at the Cornell University Medical College, was given on October 9 at the Waldorf-Astoria by his former associates of the department of medicine and the New York Hospital. Dr. Malcolm Goodridge, president of the New York Academy of Medicine, presided. Brief speeches reviewing Dr. DuBois's contributions to medicine were made by Dr. Herbert S. Gasser, director of the Rockefeller Institute for Medical Research; by Captain E. W. Brown, U. S. Navy Medical Corps; by Dr. Soma Weiss, professor of the theory and practice of physic at the Harvard Medical School; by Dr. Lewis A. Conner, professor of clinical medicine, and Dr. Constance Friess, instructor in medicine at Cornell University, and by Dr. David P. Barr, who succeeds Dr. DuBois as physician-in-chief of the New York Hospital and head of the department of medicine.

PRESENTATION of the Rumford Award by the American Academy of Arts and Sciences on October 8 was made at the annual meeting of the academy to Dr. Vladimir K. Zworykin, associate director of RCA Laboratories, specifically in recognition of his work in the development of the RCA electron microscope.

DR. LEONHARD STEJNEGER, head curator of the department of biology of the U. S. National Museum, distinguished for his work in herpetology and ornithology, will reach his ninetieth birthday on October 30.

THE retirement is announced of Dr. Ernest N. Pattee, professor of chemistry at Syracuse University. Dr. Pattee joined the faculty of the university as instructor in 1890.

DR. L. D. WOOSTER, for thirty years head of the department of biology and geology at the Kansas State Teachers College at Fort Hays and during the past two years dean of the undergraduate division, has been appointed president of the college.

CURTIS L. WILSON, professor and head of the department of metallurgy at the Montana School of Mines, has been appointed dean of the Missouri School of Mines and Metallurgy at Rolla, Mo.

DR. JOHN D. STEWART, of the surgical staff of the Massachusetts General Hospital and of the Harvard Medical School, has been appointed full-time surgeon-in-chief of the Edward J. Meyer Memorial Hospital at Buffalo, N. Y., and professor of surgery in the Medical School of the University of Buffalo.

DR. DONALD H. MCLAUGHLIN, professor of mining geology at Harvard University since 1934, a member of the faculty since 1925, has been appointed dean of the Colleges of Engineering and Mining at the University of California at Berkeley.

DR. HARRY A. OBERHELMAN, associate clinical professor of surgery at Rush Medical College, Chicago, senior attending surgeon at Presbyterian Hospital, has been appointed chairman of the department of surgery at the School of Medicine of Loyola University, Chicago. He succeeds Dr. Louis D. Moorhead, who resigned recently to devote his time to private practice.

AT Purdue University G. Bryant Bachman has been appointed to a professorship in chemistry.

DR. HILTON A. SMITH, of the department of chemistry at Lehigh University, has become professor of chemistry at the University of Tennessee.

THE *Journal* of the American Medical Association reports that Dr. Derek E. Denny-Brown, London, has taken up his work as professor of neurology at the Harvard Medical School and director of the neurologic unit at the Boston City Hospital. His appointment dates from September, 1939, but during the interval he has been on leave of absence serving as a major in the British Royal Army Medical Corps. The British War Office has now released him from military obligations for an indefinite period, during which he retains his commission in the reserve.

DR. KARL FREDERICK MATTIL, of the department of agricultural and biological chemistry of the Pennsylvania State College, has joined the research staff of the department of chemistry of the University of Pittsburgh.

DR. C. L. PEIRCE, radiologist-in-chief at the Royal Victoria Hospital, and Dr. W. L. Ritchie, director of radiology at the Montreal General Hospital, will direct a department of radiology that has recently been established in the medical faculty at McGill University.

DR. SHARAT K. ROY, curator of geology at the Field Museum of Natural History, Chicago, has returned from an expedition to study fossil deposits in the western and northern regions of New York State. He brought back various groups of invertebrate fossils, chiefly from the upper and middle Devonian periods.

DR. W. G. BURROUGHS, head of the department of geology and geography of Berea College, who has leave of absence, has been visiting places of geologic and geographic interest in the Canadian provinces and New England. Dr. G. D. Hubbard, emeritus professor of Oberlin College, is conducting Dr. Burroughs's classes during his absence. He will return to his work on November 8.

DR. WALTER H. VOSKUIL, mineral economist and head of the Section of Mineral Economics of the Illinois State Geological Survey, has been granted two months' leave of absence to join the Office of Price Administration in Washington, where he will organize the Coal Division.

THE Gehrmann Lectures of the College of Medicine at Chicago of the University of Illinois will be delivered on October 20, 21 and 22 by Major Harry G. Armstrong, of the Medical Division of the United States Air Corps School of Aviation Medicine at Randolph Field, Texas. The titles of the individual lectures are: "Medicine in Aviation"; "Selection and Care of Fliers," and "Effects of Flight on Man."

DR. H. KEFFER HARTLINE, associate professor of biophysics of the Johnson Research Foundation of the University of Pennsylvania, will deliver the first Harvey Society Lecture of the current series at the New York Academy of Medicine on October 30. He will speak on: "Nervous Activity and Visual Mechanisms."

DR. FRANCIS W. REICHELDERFER, chief of the U. S. Weather Bureau, will deliver on October 15 an address entitled "Some Famous Weather Maps" before a joint meeting of the Washington Academy of Sciences, the Washington Philosophical Society and the Washington Society of Engineers.

DR. C. H. BEHRE, JR., who was recently called from Northwestern University to a professorship of geology at Columbia University, gave on October 6 an illustrated address entitled "The Origin of South Park, Colorado," before the section of geology and mineralogy of the New York Academy of Sciences.

DR. JOHN P. PETERS, of the Yale University School of Medicine, will address an open meeting of the Philadelphia Branch of the American Association of Scientific Workers on "Social Reorganization in Medicine in the Interest of Science." The meeting will be on Friday, October 24, 8:15 P.M., at Houston Hall, University of Pennsylvania.

THE Indiana Academy of Science will hold its fifty-seventh annual winter meeting on October 30 and 31 and November 1 at Greencastle, Indiana, with DePauw University as host. The Junior Academy, composed of forty high-school science clubs, will meet on November 1. Dr. Paul Weatherwax, of Indiana University, will preside over the meeting.

A JOINT meeting of three of the founder societies of the Institute of Physics, namely, the Acoustical Society of America, the Optical Society of America and the Society of Rheology, will be held on October 24 and 25 at the Hotel Pennsylvania, New York City. Symposia have been arranged by each society and a joint luncheon of the three societies will be held on Friday noon at which the speaker will be Dr. Vanne-

var Bush, president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development.

THE meeting of the Philosophical Society of Washington on October 11 was devoted to the eclipse expedition of 1940 of the National Geographic Society and the National Bureau of Standards. The titles and authors of the papers presented were: "The Design and Construction of Eclipse Apparatus," by Dr. Irvine C. Gardner, of the National Bureau of Standards; "Contact Times of the 1940 Eclipse, Determined from Photographs of the Partial Phases," by Paul A. McNally, S.J., of Georgetown University; "Sky Brightness at Patos, Brazil, during Twilight and during the Total Solar Eclipse of 1940," by Dr. E. O. Hulburt, of the Naval Research Laboratory; "The 1940 Flash Spectrum," by Dr. C. C. Kiess, of the National Bureau of Standards (by invitation); "Radio Observations of the Ionosphere at the 1940 Eclipse in Brazil," by Theodore R. Gilliland, of the National Bureau of Standards (by invitation), and "The Story of the Expedition in Colored Motion Pictures," by R. H. Stewart (by invitation).

THE first seminar for Teachers of the History of Pharmacy was held at Madison, Wis., on July 28 and 29, under the auspices of the American Institute of the History of Pharmacy. It is intended to make this an annual feature of the institute. Special periods of the history of pharmacy and their teaching will be made the subjects of seminars, the individual topics being assigned in so far as possible to specialists in the fields concerned. Dr. Arthur H. Uhl, director of the department of pharmacy of the University of Wisconsin, president of the institute, assigned the task of determining the place and the general topic of the next seminar to a committee consisting of Drs. R. D. Bienfang, E. J. Ireland, C. O. Lee, *chairman*, Minnie M. Meyer and Dr. George Urdang.

The Harvard Alumni Bulletin reports that during the summer the work of the Harvard Public Health Unit and of the American Red Cross-Harvard Hospital, under the direction of Dr. John E. Gordon, of the Harvard Medical School, assisted by many other appointees of the staff, has proceeded rapidly. On September 22, the hospital, outside the old cathedral town of Salisbury, was formally opened to patients and the admission buildings and one ward became available. In addition to these, the laboratory is now completed and ready for research work, which has been going on since mid-January. The hospital will consist of 22 units in all, with accommodations for 126 patients—including laundry, laboratory, kitchen and quarters for the personnel. The buildings occupy an area of approximately fifteen acres.

AN Associated Press dispatch states that the Fish and Wildlife Service has apportioned $2,530,000 among the forty-eight states for restoration of wildlife under the Pittman-Robertson act. The Federal Government pays 75 per cent. of the cost of projects and the states 25 per cent. With the state contributions, the wildlife work will cost $3,373,333. The largest appropriation was allotted to Michigan, which will receive $143,946. Texas was second, with $132,716; Pennsylvania, third, $130,083; New York, fourth, $120,204, and California, fifth, $111,800. Apportionments are based on the number of licensed hunters and the area of each state. The service reported that two states, Georgia and Nevada, had failed to adopt cooperative legislation and could not obtain the apportionment funds until they did.

DISCUSSION

THE ZOOLOGICAL MUSEUM AT TRING

ZOOLOGY in Britain has been fortunate in enlisting the interests of men who not only possessed wealth, but were themselves keen students of animal life. The Biologia Centrali-Americana, issued by Godman and Salvin, contributed enormously to our knowledge of the life of the lands south of us, though of course incomplete in the light of what we know to-day. At Tring, in Hertfordshire, Lionel Walter, Lord Rothschild, founded a splendid museum, devoted principally to birds and Lepidoptera. I visited it several years ago, and was shown over the place by Dr. K. Jordan, who works on fleas and certain beetles, as well as Lepidoptera, and is one of the keenest entomologists of his time. I was amazed at the collections and the elegant way in which they were displayed; thus the drawers of butterflies have glass below as well as above, so that one only has to turn the drawer over to see the undersides of the wings. The arrangements for study, with perfect lighting, are also very noticeable, so that when Dr. Jordan said I should be welcome to work there, I regretted that circumstances would make this impossible, and that moreover the collections did not include the subjects of my studies.

Then there came a time when the Tring Museum was the occasion of serious criticism. There had been a sort of tacit understanding that the great collection of birds would some day go to the British Museum, which had in fact neglected to secure various species which were known to be at Tring. Rothschild, for financial reasons, decided that he must sell his study collection of birds, and without even giving the British

Museum a chance to bid on it, disposed of the whole to the American Museum in New York. If it had to go abroad, there was certainly no place so suitable, and recent publications show how valuable it has been to American students. In the collection were the type specimens of a number of subspecies of birds peculiar to the British Islands, their description resulting from the critical (some would say hair-splitting) studies of recent times. The authorities of the American Museum, to the gratification of all concerned, presented these British specimens to the British Museum.

In spite of these causes of discontent, Lord Rothschild, who came to greatly regret having parted with the birds, wished to associate himself with the British Museum, and when he died, willed the whole institution to that Museum, to be kept up as a research center for zoologists. There was some discussion as to the acceptance of this gift, with its necessary obligations, but most zoologists warmly supported the proposal and the trustees took on the Tring Museum as a branch of the British Museum of Natural History. The advantages are many. There are the buildings and the great collections, with excellent facilities for work. The situation, distant from London, avoids the dreadful fogs of the metropolis, and (as was not then thought of) the danger from enemy bombs. It is possible, at Tring, to work in peace, without the innumerable interruptions which are unavoidable at the British Museum. Thus the place is a veritable haven of refuge and will undoubtedly contribute more and more to zoological science.

In Rothschild's day, it was found difficult or impossible to publish the numerous papers resulting from the work of the museum in the ordinary scientific journals. There was accordingly established a periodical called Novitates Zoologicae, which has now reached the forty-second volume. I am glad to see that the British Museum is keeping this going, and a bulky part of 180 pages, dated October, 1940, is now before me. It consists entirely of a monographic revision of the Mexican water beetles of the family Elmidae, by Dr. H. E. Hinton, of the British Museum. It must be admitted that not many of us are vitally interested in Mexican water beetles, as such, but the work is of wider value than its title would suggest. For example, Hinton has specially investigated the internal anatomy of his beetles, something an entomologist hardly ever does. He finds that the internal organs throw considerable light on taxonomic problems. Thus the genus *Cylloepus* is found to consist of two very distinct groups, which are treated as different genera. The beetles, without dissection, are easily separated by the presence or absence of a certain patch of tomentum, but ordinarily this would not be thought of as a generic character. The larvae are also described at considerable length, and the larval characters contribute to the system of classification. There is an interesting discussion of the problem of description. It is pointed out that it is impracticable and undesirable to enumerate all the characters of an insect, but at the other extreme, too short descriptions, even if they suffice to separate the insects from other known species, may fail utterly when numerous new species are discovered. Thus there has to be a middle-of-the-road policy, and the successful describer is he who knows his group, and can judge of the characters likely to prove important. The Mexican Elmidae have been so little known that all the species seen by Hinton have been described by two men only, 14 by Dr. David Sharp and 23 by Hinton. Many more undoubtedly remain to be discovered.

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ALCAPTONURIA IN A NEGRO FAMILY

ALCAPTONURIA is an outward manifestation of a very rare anomaly of protein metabolism in which homogentisic acid is excreted in the urine. This defect in body chemistry is hereditary and appears to be a rare recessive character in the Mendelian sense. Its mode of incidence is remarkably similar to that of albinism. Its presence, however, is not as strikingly apparent as is that condition. The error in metabolism is present from birth and persists throughout life.[1]

Comparatively few instances of alcaptonuria have been reported in this country. Of approximately 122 cases in the literature in 1929, only 17 occurred in the United States, the majority having been reported from European countries.[2] At the present time only 21 of the total number of recorded cases were reported in this country. As the condition is most often recognized by accident, undoubtedly more alcaptonurics exist than the records show.

Alcaptonuria in the American Negro has never been reported. We know that albinism exists among Negroes. Nothing, however, is known of the existence in this race of the other, less obvious, inborn errors of metabolism.

It is the purpose of this article to report the occurrence of alcaptonuria in two children of a Negro family. Fig. 1 is a diagram of the members of the family investigated. None but the two children was affected. The girl (D), 8 years old, was recognized during a routine examination in the out-patient clinic as a probable alcaptonuric from the atypical reduction of Benedict's solution given by her urine. On

[1] A. E. Garrod, "Inborn Errors of Metabolism," 2nd Edition, London, 1923.

[2] E. S. Bagnall, *New Eng. Jour. Med.*, 201: 422, 1929.

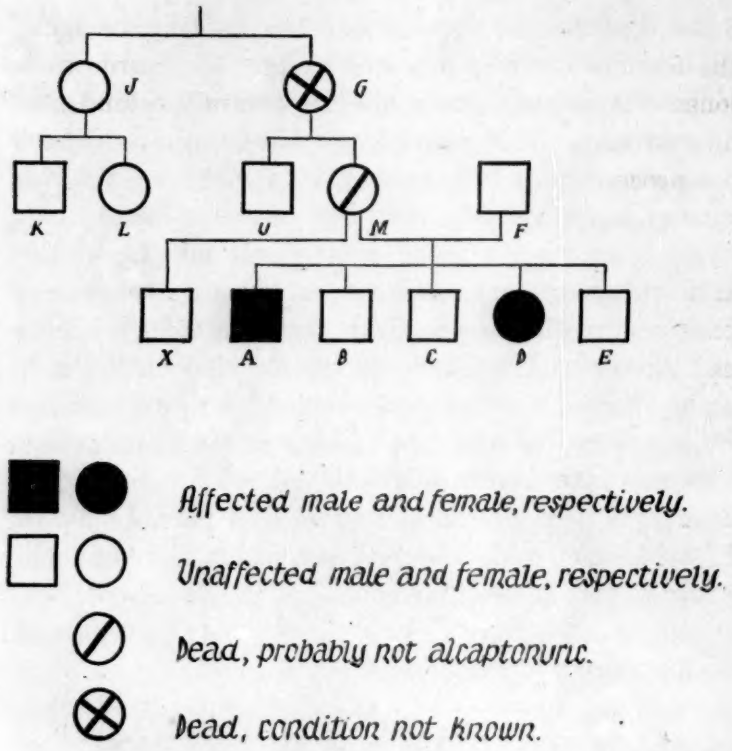

FIG. 1

examination, the urine was found to give the reactions characteristic of homogentisic acid: addition of 10 per cent. sodium hydroxide resulted in a brownish-black ring at the surface which gradually penetrated downward, ferric chloride caused a transitory blue color with each drop, and reduction of silver lactate and of ammoniacal silver nitrate proceeded rapidly at room temperature. The urine, as excreted, was amber, clear and acid. Quantitative analyses showed a concentration of homogentisic acid (Briggs's method[3]) in a random sample of 5 gm per liter with a homogentisic acid to nitrogen (H:N) ratio of 53.5:100. A larger sample, used for isolation of homogentisic acid, contained 4.4 gm per liter, and the H:N ratio was 45.1:100.

Investigation of the girl's four brothers revealed the fact that her eldest brother (A), 13 years old, also was excreting homogentisic acid. Qualitative tests were positive. The H:N ratio of a sample was 48.3:100. These ratios agree well with those given in the literature. The qualitative tests were confirmed by actual isolation of homogentisic acid from the lead salt obtained from the urine of both children.

The father (F) is not an alcaptonuric. Negative tests for urinary sugar on the mother (M), who died in the hospital in 1935, are considered evidence of the absence of any reducing substance in her urine. She probably was not alcaptonuric. The children's parents (F and M) were not related. The half-brother (X), 17 years old, the offspring of a previous marriage of the mother, is not an alcaptonuric. This would be expected if the error is a simple recessive character. It recalls the very interesting case of two alcaptonurics, brother and sister, whose parents later married others and had children, none of whom showed alcaptonuria.[4] The father's relatives are all in the Carolinas and thus unavailable for examination. The mother's brother (U) is not alcaptonuric. Unfortunately, the grandmother of the children (G) died one week before this study was undertaken. Whether or not she may have been alcaptonuric is not known. The grandmother's sister (J) and her children (K and L) are not alcaptonuric.

The two children (A) and (D) appear healthy and well nourished. They are typical American Negroes in every respect. That they have been alcaptonuric since infancy is attested by the fact that the father well recalls the staining of the bedding caused by the urine of these two children.

SUMMARY

A report of the occurrence of alcaptonuria in two children of a Negro family is presented. Other members of the family were investigated and found to be unaffected. This is the first evidence that this inborn error of metabolism exists in the American Negro.

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HUMAN GENE SYMBOLS

IN no field of science is there greater lack of uniformity with respect to the usage of symbols and greater lack of adherence to conventional genetic rules than in the field of human genetics. For instance one finds in recent human genetic literature the statement, "the three allelomorphic blood group genes A, B, and R," and the statement, "the blood group alleles M and N." Such usages lack logic and clarity and are not in accordance with generally accepted genetic rules.

For a long time it has been the custom in dealing with the genetics of lower forms to give all members of a given allelomorphic series the same basic symbol and to distinguish one member of a series from another by capitalization or by a superscript. For instance, the piebald alleles of the house mouse are designated as S and s, and the albino allelomorphic series of guinea pig coat color genes are designated as C, c^k, c^d, c^r, c^a. These same rules should be applied to all human alleles.

To indicate the genes responsible for the presence or absence of isoagglutinogens A and B and for the M and N agglutinogens the writer has used the following symbols: I^A—isoagglutinogen A; I^B—isoagglutinogen B; i—absence of A or B; A^m—agglutinogen M; A^n—agglutinogen N.

[3] A. P. Briggs, *Jour. Biol. Chem.*, 51: 453, 1922.

[4] A. E. Garrod, *Lancet*, 2: 1616, 1902.

These symbols seem appropriate and in agreement with general rules, and since, as far as the writer is aware, no other sets of blood group symbols have been generally employed, he suggests that the above symbols be considered for general usage.

Perhaps the time is ripe for the establishment of a committee or an organization of some kind to formulate rules for an international system of human gene symbols. However, the current international situation does not make this seem feasible at the present time. A less ambitious program is to attempt agreement among investigators in this country. If this were achieved, much would have been accomplished.

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FEEDING BEHAVIOR OF A WATER SNAKE

ON June 4, 1941, in a swamp a mile northwest of Voorheesville, N. Y., I witnessed an interesting feeding procedure of the common water snake *Natrix s. sipedon* (Linnaeus). As I walked along the railroad tracks, at this point elevated about eight feet above the floor of the swamp, my attention was directed to a disturbance of the water in an isolated, shallow, muddy pool approximately two feet in diameter, 3 to 4 inches deep and about 25 feet distance. Cause for the disturbance was a water snake about three feet long. After partially concealing myself behind the base of an electric signal tower, I continued to view the proceedings from that vantage point—part of the time aided by 8× binoculars.

At short intervals the active reptile coiled, writhed and twisted its body vigorously as it moved round and round in the little pool, thus agitating the water but making no effort to leave the area. After a few seconds of this violent exertion it suddenly became quiet, usually with its head directed toward the periphery of the pool. Occasionally the snake crawled slowly about in the water apparently on the alert for small living forms that might have been dislodged from the bottom by its movements. Frequently the reptile struck at something in the debris surrounding its feeding place. This performance was repeated several times within the space of 20 minutes.

To the observer the energetic aquatic activities of the snake appeared to be *deliberate* and *purposeful* in that they served to free small animal forms from the mud and debris at least some of which fell prey to the reptile.

DAYTON STONER

NEW YORK STATE MUSEUM

SCIENTIFIC BOOKS

CHEMISTRY

A Practical Survey of Chemistry. By WALTER S. DYER. vii + 480 pp. 107 figs. New York: Henry Holt and Company. 1941. $2.80.

COLLEGE science has for many generations largely confined itself to exhaustive formalized courses in specific fields. Fundamental courses of this sort will always be required for training the specialist. Of late, however, there has arisen a demand for general scientific knowledge by the layman who never intends to specialize but who wishes to acquire an intelligent comprehension of scientific principles and facts.

One indication that this challenge is being recognized and answered is evidenced by the General Education Series of books, of which "A Practical Survey of Chemistry" is a new member. Dr. Malcolm S. MacLean, of Hampton Institute, and well known for his creative work as past director of the General College of the University of Minnesota, is editor of this series. In his preface to Dr. Dyer's text he states: "It is one of the first books in the field of the physical sciences in general education which offers a sound basis to the student. It will have the effect of diminishing the blindness and resistance of nonscience students to this study."

This book represents an excellent balance between theory and practice. The applications of chemistry to daily experience are so frequently and clearly presented throughout all the chapters as to make its perusal intensely interesting, even to the casual reader. Interest is further enhanced by the large and excellent selection of half-tones and line drawings. Yet fundamental chemical theory is introduced in support and explanation of facts. Certain chapters, such as those on the classification of the elements and atomic structure, are of necessity largely theoretical.

Dr. Dyer has skillfully chosen and coordinated his topics, ranging from the gas laws and the elements to plastics, foods and hormones. He supplements each chapter with a summary, review questions and a bibliography. Very recent developments of the science have not been overlooked.

In the effort to be practical scientific accuracy is occasionally sacrificed. We read of candy turning to sugar; of boiling an egg in a saturated solution of sugar; of the query "Why does a mixture of salt and ice get cold?" One wonders in reading the text to what extent it was sired by the pioneer book of Timm —once termed a pandemic text. Many of the cuts are taken from Timm. Frequently the order of subject-

matter closely follows that book. In a few cases the wording is identical.

"A Practical Survey of Chemistry" will find ready acceptance with teachers who must stress the cultural side of chemistry, and to such Dr. Dyer has made a timely and valuable contribution.

R. W. GETCHELL

IOWA STATE TEACHERS COLLEGE

Fundamental Chemistry. By HORACE G. DEMING. xviii + 756 pp. Illustrated. New York: John Wiley and Sons; London: Chapman and Hall. 1940. $3.50.

AN interestingly different text-book, in which general chemistry is carefully boiled down to elementary principles, with minimum attention to descriptive, industrial and cultural aspects. Written for the inquisitive student.

HUBERT N. ALYEA

PRINCETON UNIVERSITY

General College Chemistry. By JOSEPH A. BABOR and ALEXANDER LEHRMAN. xiv + 659 pp., 151 figs. Thomas Y. Crowell Company, New York City, 1940, price $3.75.

Introductory College Chemistry. By JOSEPH A. BABOR and ALEXANDER LEHRMAN. xiii + 663 pp., 138 figs. Thomas Y. Crowell Company, New York City, 1941, price $3.50.

GENERAL COLLEGE CHEMISTRY is designed primarily for students who have had high-school chemistry, whereas "Introductory College Chemistry" (this book replaces "Elements of General Chemistry," by Babor, Estabrooke and Lehrman) is designed for two types of courses: (1) courses composed for students who have had high-school chemistry and (2) courses in which no differentiation between students is made on the basis of high-school preparation.

Frankly, the essential difference in the two books seems to be mainly in the order of presentation of the material. The sequence of topics in the "Introductory College Chemistry" is arranged to avoid the presentation of all the theoretical principles in a continuous order, whereas the "General College Chemistry" presents the working portion of theoretical principles previous to any discussion of the properties of the elements and their compounds. In other words, the only differences in the two books are the necessary changes in the introductory paragraphs of the various chapters resulting from the different arrangement of the material. One example will illustrate the point. The discussion of organic chemistry is introduced early in the list of topics in the "Introductory College Chemistry." On the other hand, all the material about organic chemistry is placed in the last chapter of "General College Chemistry."

Both books apply current views of atomic structure to the explanation of the properties of the elements. Quantitative experimental data are employed in the discussion in the fundamental principles and modern theories. The hydrogen ion, H^+, is used for simplicity instead of the hydronium ion, H_3O^+, in the discussion of oxidation-reduction reactions. However, the latter ion (H_3O^+) is used exclusively in the discussions of ionic equilibrium following the chapter on acids and bases. The more recent concepts of acids and bases are presented in a very clear manner.

In each book the chapters on atomic structure, electronic distribution and valence furnish splendid examples of the evolution of material presented in elementary courses over a period of years. The books illustrate how possible it is to utilize our present knowledge of atomic structure in the discussion of the laws of chemical combination, valence and the structure of matter.

A wealth of material written in a very clear manner is included in each text. Carefully selected problems and questions are utilized to illustrate the principles discussed and correlate various concepts. Several tables of data which are useful to the teacher and to the student for the solution of problems and the illustration of principles are included in the appendices. The two books are not as extensively illustrated as some of the books now on the market, but the illustrations are well chosen and well drawn.

Teachers of elementary chemistry should find either of these books to be very satisfactory for class use, or, if not, as an excellent reference book to supplement another text.

L. L. QUILL

OHIO STATE UNIVERSITY

REPORTS

SOME EDUCATIONAL EFFECTS AND IMPLICATIONS OF THE DEFENSE PROGRAM[1]

I CAN say with propriety that our defense work is concerned with problems of urgent importance to our country's military effectiveness and that gratifying progress is being made in attaining objectives. These statements are true not only of the activities under

[1] From the report of Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, to members of the corporation.

way at this institution, but of the over-all Federal scientific research program in which more than a hundred other educational institutions and many industrial organizations are collaborating in the greatest scientific mobilization in the history of our country.

While the diversion of energies to defense work has disrupted many normal activities and retarded important developments in both education and research, the defense program promises some important gains in terms of the peace-time objectives of educational institutions which are actively engaged in it. It is serving to bring educational staffs into closer contact with industry and operating agencies of the government. It is promoting cross-fertilization among many different fields and many fine minds from different backgrounds. Much of the research is actually an intensification of investigations already under way and is so fundamental that we would have welcomed at any time the opportunity to undertake it with the effectiveness that subventions from government and industry now make possible. While contributing directly to war-time needs, it is yielding new developments, new techniques and new understanding which will have important peace-time applications and which presage a new prosperity for science and engineering after the war.

The program has likewise provided a dramatic demonstration of the national usefulness of an educational institution which maintains a great staff and facilities for research and development in those forward-flowing streams of science which become the reservoirs of power when engineering art has harnessed them. This harnessing of science is accelerated in a time of national emergency. Nowhere else in our country, except in our great educational centers of research, is there a comparable reserve of scientific man-power, of new technological ideas, of laboratory facilities. A few such outstanding institutions become, in time of emergency, centers of concentration on objectives of first magnitude. Other institutions, less powerful in research facilities, play their important rôles as centers for other important work of less magnitude and as reservoirs of technical man-power. In normal times, each and all contribute to the education of our people, the operation of our industrial economy and the increase of scientific knowledge in this technological age.

From the lessons of the present situation I see emerging as a clear objective the outlines of an educational and research institution based upon the present ideals and objectives but incorporating a greatly magnified capacity for national service and commanding a wider recognition of the availability of its technological assets for use by government and industry.

Let me describe this institution of to-morrow as a "super institute of technology" and suggest some of its features, as drawn from the lessons of past and present. It should possess an operating organization flexible enough to meet emergency conditions, alert enough to provide the *modus operandi* for meeting unusual needs in normal times and farsighted enough to provide the means of dealing with new needs or opportunities in advance of their urgent demands. The institution must be organized quickly and effectively to assist industry and government in the solution of both normal and emergency problems and in obtaining highly qualified men. Through the possession of advanced and specialized equipment and laboratories it must have investigatory resources anticipating future needs and not available elsewhere. Of major importance, it must have a staff of outstanding experts marked not alone by individual brilliancies but by a homogeneous strength that insures cooperative, creative work, capable of developing a body of advanced thought and applying it to new problems. And finally, it must have a student body of the highest possible caliber—graduate students of distinction and undergraduates of honors caliber and treated as honors students.

In idealized terms this is the type of institution toward which we should aspire. Our trend has been in this direction; our resources, traditions and prestige give us a good basis from which to proceed. The experiences of the present emergency serve to reenforce our faith in the social values and the practical feasibility of this educational ideal. What we need to have are considerably ampler financial resources and wisdom in using them.

Of our actual trend in this direction there have been many evidences, aside from the defense program, in the past few years. The increasingly careful selection of undergraduate students, the growth of our graduate school without prejudice to the undergraduate program, the mounting volume of pure scientific research and of research and development projects brought to us by government and industry, the increasing number of graduate fellowships supported by industry and the growing demand for technically trained men, especially those with graduate training, are indications of the trend. Certainly it is not idle speculation to observe that when the demands of the present emergency have been fulfilled, science and engineering will be faced with the task of creating new wealth to replace the colossal waste of war, and that this will require technological institutions of ampler resources and instrumentalities for public service than we have to-day, and that the Massachusetts Institute of Technology should serve in these directions with all the effectiveness and resource which we can muster.

SPECIAL ARTICLES

THE COMPARATIVE VALUE OF THE BLOOD PLASMA VITAMIN A CONCENTRATION AND THE DARK ADAPTATION AS A CRITERION OF VITAMIN A DEFICIENCY

RECENTLY several investigators have shown[1, 2, 3] that poor dark adaptation may occur before vitamin A deficiency becomes so extreme as to cause clinically manifest symptoms of this deficiency, such as night-blindness and xerophthalmia. In the present study, we have compared the results of dark adaptation tests with plasma vitamin A values in infants and children and have also investigated the relation between the plasma vitamin A concentration and the vitamin A intake in infants.

We have previously shown[4] that the concentration of vitamin A in the blood plasma reflects the level of vitamin A intake in the rat when this intake is less than 50 International units daily. Thus, at intakes of 0, 1, 2, 10 and 25 units daily for 6 weeks, the average plasma concentrations of vitamin A at the end of this time were, respectively, 0, 7, 14, 35 and 69 units per 100 cc. The plasma vitamin A concentration reached an optimal value (about 100 units per 100 cc) at an intake of 50 units daily, and remained at this optimal level for intakes up to 1,000 units of vitamin A daily. There was no storage in the liver, the chief reservoir of vitamin A in the body, at plasma vitamin A concentrations less than 35 units per 100 cc, slight storage at concentrations between 35 and 50 units per 100 cc, and increasingly larger storage at blood plasma concentrations above 50 units per 100 cc.

Forty-six infants, 3 weeks to 6 months of age, receiving 1,200 to 1,500 units of vitamin A daily in their diet showed a mean plasma vitamin A concentration of 74 units per 100 cc. This value differed significantly from the mean value, 93 units per 100 cc, in a group of 47 infants of the same age and on the same diet, but receiving a supplement of 17,000 units of vitamin A daily. Dark adaptation tests revealed no difference between the mean final rod threshold values of two groups such as described above; the technique for determining dark adaptation in infants was previously described.[5] In these 93 normal infants, we encountered no plasma vitamin A concentration below 45 International units per 100 cc; this value would therefore seem to be the lower limit of normal, on the basis of our analyses.

Six infants, 3 weeks to 2½ months of age, were placed for periods of from 2 to 4 months on a diet which contained about 335 units of vitamin A daily, or one fourth the vitamin A content of the average diet for this age. The average concentration of vitamin A in the plasma before the institution of this diet was 74 units per 100 cc; at the termination of this diet the average plasma vitamin A concentration had fallen to 61 units per 100 cc. There was a decrease in the plasma concentration of vitamin A in every case, ranging from 4 to 23 units. Yet, in no instance did the dark adaptation become abnormal.

A second group of 12 infants, 1½ to 4 months of age, was placed on a diet devoid of vitamin A for periods of from 2 weeks to 4½ months. During this time the infants appeared normal, gaining well and being no more susceptible to infections than those receiving large quantities of vitamin A. Of 4 infants who received the vitamin A-free diet for a period of 2 to 6 weeks, one showed a plasma vitamin A concentration of 37 units per 100 cc, well below the lower limit, 45 units per 100 cc, of the normal range in infants of this age. Of the 8 infants who were on the diet for 2 to 4½ months, 6 showed low values ranging from 11 to 44 units per 100 cc. The 2 infants whose plasma concentration of vitamin A did not fall below 45 units had received 17,000 units of vitamin A daily for one month prior to the beginning of the vitamin A-free diet and presumably had accumulated large stores.

All 7 infants who had low plasma vitamin A concentrations—that is, concentrations below 45 units per 100 cc, also had abnormal dark adaptation. Five of these infants were then given 150 units of vitamin A daily for one month. As shown in table 1, the dark adaptation became normal in every instance, although the plasma concentrations of vitamin A remained low. In other words, at this stage the plasma vitamin A level revealed clearly the known history of a greatly restricted vitamin A intake, whereas the dark adaptation tests gave no suggestion of it.

Nineteen normal children, 6 to 12 years of age, showed an average plasma vitamin A concentration of 117 units per 100 cc (range: 70 to 197 units). Dark adaptation tests revealed normal final rod thresholds in every one of these 19 children. In contrast, 118 children of the same age group who had been admitted to the hospital because of malnutrition, upper

[1] S. Hecht and J. Mandelbaum, *Jour. Am. Med. Assn.*, 112: 1910, 1939.
[2] J. M. Lewis and C. Haig, *Jour. Pediatrics*, 16: 285, 1940.
[3] P. C. Jeans, E. L. Blanchard and F. E. Satterthwaite, *Jour. Pediatrics*, 18: 170, 1941.
[4] J. M. Lewis, O. Bodansky, K. G. Falk and G. McGuire, *Proc. Soc. Exptl. Biol. Med.*, 46: 248, 1941.
[5] J. M. Lewis and C. Haig, *Jour. Pediatrics*, 15: 812 (1939).

TABLE I

THE EFFECT OF THE ADMINISTRATION OF 150 UNITS OF VITAMIN A DAILY FOR A PERIOD OF FOUR WEEKS ON THE PLASMA VITAMIN A CONCENTRATION AND ON DARK ADAPTATION IN INFANTS PREVIOUSLY FED A VITAMIN A-FREE DIET FOR TWO TO FOUR MONTHS

Name	Age	Plasma vitamin A concentration		Final rod threshold	
		Prior to administration	After administration	Prior to administration	After administration
	Months	Units per 100 cc		Log micromicrolamberts	
J. K. ...	3½	13	16	4.4	3.3
A. I. ...	3½	44	48	4.4	3.0
N. R. ...	5½	11	16	5.0	3.0
J. R. ...	6	23	35	4.7	3.3
L. R. ...	3¾	30	26	3.8	3.0

respiratory infections, rheumatic fever, dysentery, etc., showed an average plasma vitamin A concentration of 89 units per 100 cc (range: 25 to 198 units). It should be emphasized that these children were tested when they were afebrile, as it has been shown[6] that the concentration of vitamin A in the plasma falls precipitously during fever and returns to normal rapidly after defervescence. Twenty-two or 19 per cent. of these 118 children had plasma vitamin A concentrations below 67 units per 100 cc, the value we designated as the lower limit of normal in this age group. Only one of these 118 children exhibited abnormal dark adaptation.

The above results demonstrate that the plasma vitamin A concentration is a considerably more sensitive indicator of vitamin A deficiency than is the dark adaptation. We have recently observed an instance of malnutrition in an adult which illustrates this point strikingly. A woman in the seventh month of pregnancy had subsisted for several weeks on a diet consisting chiefly of coffee. She had developed marked anemia and polyneuritis; the latter cleared up promptly following thiamin chloride therapy and was evidently due to vitamin B_1 deficiency. The dark adaptation test showed a normal final rod threshold. In sharp contrast, the plasma vitamin A concentration was 40 units per 100 cc, a value considerably less than the lowest value obtained by Kimble[7] in a series of 34 normal women, namely, 64 units per 100 cc.

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[6] S. W. Clausen and A. B. McCoord, *Jour. Pediatrics*, 13: 635, 1938.

[7] M. S. Kimble, *Jour. Lab. Clinical Med.*, 24: 1055 (1939).

PATHOGENESIS OF ERYTHROBLASTOSIS FETALIS: STATISTICAL EVIDENCE[1]

IT was recently suggested[2] that erythroblastosis fetalis, a familial hemolytic disease of the newborn, results from the passage of the mother's immune agglutinins through the placenta to act on the susceptible blood of the fetus. The evidence indicates that the mother is immunized by a particular blood factor, Rh, transmitted from the father to the fetus but lacking in the mother. This isoimmunization of the mother was proposed as the explanation of the cause of hemolytic transfusion accidents associated with pregnancy.[3,4,5]

The agglutinable substance involved is the Rh factor recently discovered by Landsteiner and Wiener with the aid of rabbit sera obtained by immunization with rhesus blood.[6] Such agglutinins were shown to give reactions which ran parallel to the atypical agglutinins in the mothers' sera, induced, presumably, by isoimmunization with fetal blood.

To obtain further data on the relationship of the Rh factor and anti-Rh agglutinin to this disease, a statistical study was undertaken which forms the basis of this paper. The isoimmunization theory requires that the mothers of infants with erythroblastosis fetalis be Rh negative, while the affected child and the father must be Rh positive. Consequently, a selected population of such mothers should show a higher incidence of Rh negative than the random population. Furthermore, the fathers and the affected children should invariably be Rh positive. The results in Table 1 which conform to the theoretical expecta-

TABLE I

	Rh positive	Rh negative
Random population		
Male 829	86.2 per cent.	13.8 per cent.
Female 206	88.4 " "	11.6 " "
111 mothers of infants with erythroblastosis fetalis ..	9.0 " "	91.0 " "
66 husbands of Rh-negative mothers	100.0 " "	
58 affected infants	100.0 " "	

[1] From the Division of Laboratories, Newark Beth Israel Hospital, Newark, N. J., and the Laboratories of Mt. Sinai Hospital, New York, and the Woman's Hospital, New York. Aided by a grant from the Blood Transfusion Betterment Association of New York City.

[2] P. Levine, E. M. Katzin and L. Burnham, *Jour. Am. Med. Asn.*, 116: 825, 1941.

[3] P. Levine and R. E. Stetson, *Jour. Am. Med. Assn.*, 113: 126, 1939.

[4] A. S. Wiener and H. R. Peters, *Annals Int. Med.*, 13: 2306, 1940.

[5] P. Levine and E. M. Katzin, *Proc. Soc. Exp. Biol. and Med.*, 45: 343, 1940.

[6] K. Landsteiner and A. S. Wiener, *Proc. Soc. Exp. Biol. and Med.*, 43: 223, 1940.

tion provide striking evidence to support the importance of the Rh factor in the etiology of erythroblastosis fetalis.

In a general way it may be assumed from these findings that isoimmunization of the Rh negative mother by the Rh factor of the fetus may explain the incidence of erythroblastosis fetalis in 91 per cent. of the families studied. That other blood factors are capable of inducing isoimmunization is shown in one of the 10 Rh positive mothers whose blood contained an atypical agglutinin of an entirely different specificity.[7] Still another blood factor identified by an agglutinin recently described by Levine and Polayes[8] is capable of inducing isoimmunization. This woman, who suffered a transfusion accident during her puerperium of her twelfth pergnancy, had 4 miscarriages but no infants with erythroblastosis fetalis.

The studies on the specificity of various anti-Rh sera produced by isoimmunization in these mothers showed that these sera differ somewhat in their specificity. While the great majority of bloods give identical reactions when tested with various anti-Rh sera, several bloods inactive with a particular serum were found to react with other sera. A similar finding was observed by Landsteiner and Wiener.[9]

Consequently, the bloods of the remaining 9 Rh positive mothers not containing atypical agglutinins will have to be retested with the new agglutinins as well as with a variety of anti-Rh sera.

The correlation of anti-Rh agglutinins and the postpartum interval when the first tests were done, is shown in Table 2.

TABLE II

Incidence of anti-Rh agglutinins in 101 Rh-negative mothers

Interval after last delivery of an affected infant	Agglutinins present	Agglutinins not found
2 months	24	23
2 months to 1 year	3	7
1 year or longer	2	36
No data	0	6
Total	29	72

Atypical agglutinins in the Rh negative mothers were found in 50 per cent. of the cases in tests made within the first two months after delivery of an infant with erythroblastosis fetalis. It may be assumed that the incidence of anti-Rh agglutinins will be higher if such mothers are tested at intervals in the course of subsequent pregnancies which may result in other affected infants.

[7] This case, a patient of Dr. C. Javert, will be published separately.

[8] P. Levine and S. H. Polayes, *Annals Int. Med.*, 14: 1903, 1941.

[9] K. Landsteiner and A. S. Wiener, personal communication.

It is of interest that in 2 cases atypical agglutinins could still be demonstrated 2 and 2½ years, respectively, after the last delivery of an infant with erythroblastosis fetalis.

According to the concept of isoimmunization, the mother's immune agglutinins pass through the placenta and exert lytic action on the susceptible fetal blood. However, this could not occur if the Rh factor had a wide distribution in tissue cells and body fluids, which would specifically bind the anti-Rh agglutinins. Tests made with numerous specimens of saliva and a small number of specimens of seminal fluid and sperm cells of Rh positive individuals indicated that the Rh factor was not present in this material. Thus there is justification, at least for the present, to assume that the Rh factor may be limited to red blood cells.[10] However, a comprehensive study of various organs and body fluids is desirable.

In a future publication evidence will be presented that the familial nature of erythroblastosis fetalis depends upon the heredity of the blood factors involved. The striking incidence in certain mothers and the sporadic occurrence in others depends upon the homozygosity or heterozygosity of the father's blood. That the Rh factor is inherited as a mendelian dominant property was recently demonstrated by Landsteiner and Wiener.[9]

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MOSAIC, CHLOROSIS AND NECROSIS IN VIRUS-INFECTED PERENNIAL PEPPER CAUSED DIRECTLY BY PRODUCTS OF A DERANGED METABOLISM[1]

IN *Capsicum frutescens* L., a tropical perennial pepper, the level of concentration for Nicotiana Virus 1 is relatively low under all conditions of growth studied. When the leaves are wiped with virus local necrotic lesions develop and the leaves abscise.[2] When the inoculated plants are cultured near 32° C. small quantities of virus pass from the inoculated leaf, and systemic infection occurs,[3] but does not when cultured near 23° C. At the high temperatures the branches, stems, taproots and roots become necrotic. These tissues develop a dark brown to black color and death results. Old woody plants are more resistant than young succulent plants.

[10] *Cf.* A. S. Wiener and S. Forer, *Proc. Soc. Exp. Biol. and Med.*, 47: 215, 1941.

[1] Studies conducted under Bankhead-Jones Project S.R.F. 2–17, U. S. Department of Agriculture, Bureaus of Plant Industry and Agricultural Chemistry and Engineering cooperating.

[2] F. O. Holmes, *Phytopathology*, 26: 896, 1936.

[3] H. H. McKinney, *Jour. of Heredity*, 28: 51, 1937.

Before abscission, a secondary chlorosis usually involves the leaf tissues not included in the local infection sites, especially at the higher temperatures with summer sunlight. When one small marginal zone on the leaf or the petiole is inoculated, the secondary chlorosis involves the entire leaf.

Over a period of five years, 125 lots of leaf tissue well outside of the inoculated zones were isolated before and during the progress of secondary chlorosis, and in no case was a sign of virus obtained in *Nicotiana tabacum* L., *N. glutinosa* L., *N. langsdorffii* Schrank, *N. sylvestris* Spegaz. and Comes, or in *Phaseolus vulgaris* L., variety Scotia. Extracts from these pepper tissues were dialyzed to remove any possible inhibiting agent, but no signs of virus were obtained after dialysis.

The inoculated zones, with few exceptions, contained virus. However, 11 lesions per leaf on beans was the highest count obtained; usually the counts were less.

Typical, fully developed light- and dark-green mosaic mottling frequently appeared on new leaves remote from the zones of inoculation when woody pepper plants were cultured near 32° C. This mottling sometimes persisted for several days before the leaves became necrotic. Separate assays made on 10 mosaic leaves revealed no signs of virus before the appearance of necrosis, but when the first faint signs of necrosis appeared in the mottled leaves, virus could be detected in the tissues by means of inoculations into tobacco. Attempts to demonstrate that this mosaic is caused by a virus specific to pepper plants failed.

In the branches, stem, taproot and roots, the virus was most concentrated in or very near to the necrotic cortex or cambium. No virus was detectable in the necrotic xylem of the stem.

When the lateral roots or the tap roots were inoculated and the plants were cultured near 32° C. necrosis resulted but did not advance more than one-half inch up the stem, and no signs of virus were revealed above this point. However, when the lower stem or the upper part of the tap root was girdled and the xylem was solidly necrotic, these plants wilted. Tests indicated that the water-conducting tissue was obstructed as a result of the necrosis. Necrosis occurred considerably in advance of the virus in the xylem, but not in the cortex.

It is concluded that the secondary chlorosis, the mosaic mottling and the xylem-necrosis are induced directly by translocated or diffused products of a deranged metabolism, which in turn is induced by relatively small amounts of virus in remote zones.

Typical fully developed mosaic mottling in tobacco has not been observed to occur in advance of the virus. However, this does not preclude the possibility that mosaic in tobacco is induced directly by the products of a deranged metabolism.

One of the authors (Hills) found that pepper-leaf tissue in the advanced stages of secondary chlorosis contained an increased amount of peroxidase, and reduced amounts of oxidase and catalase, in comparison with alternate normal leaves from the same branches. These alterations in enzyme balance, and the ultimate chlorosis, show that the virus is capable of inciting profound changes in tissues remote from zones of detectable virus, and finally, these changes are so drastic in the necrosed pepper tissues that the virus is completely destroyed soon after these tissues have desiccated.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR CONTINUOUSLY DETERMINING THE RATE OF OXYGEN CONSUMPTION FOR LABORATORY ANIMALS

METHODS now available for determining the rate of oxygen uptake of animals consist essentially of methods of measuring the volume of oxygen taken up over known periods of time. The value for the rate of oxygen uptake calculated from such data gives an average value of the rate over the interval of time employed and tends to obscure any rapid changes that may have occurred. The present apparatus was designed for use in experiments where changes in metabolism occur rapidly and where a prolonged continuous record is desired giving instantaneous values for the rate of oxygen uptake.

The apparatus consists of an air-tight chamber just large enough to hold the animal, lined with wire gauze soda lime containers. These should be arranged so as to assure a rapid and constant rate of absorption of expired CO_2. This chamber is connected with an orifice type flowmeter which consists of a capillary connecting the oxygen supply with the chamber, across which is connected a U-tube water manometer. The rate of flow of oxygen through the capillary is proportional to the pressure across it, so that it is an easy matter to calibrate the reading of one arm of the manometer to read directly in cc/min. This calibration is accomplished by setting the pressure to different values by means of the reducing valve on an oxygen tank and determining the corresponding flow by timing the displacement of water from a volumetric

flask. A typical calibration curve so obtained is shown in Fig. 1.

The reading of one arm of this manometer is made automatic and continuous by placing it before a slit in a light-proof box containing a kymograph loaded with photographic paper (Eastman Kodak type Azo 4). The light from a point source, such as an automobile headlight bulb 2 meters away, is focused on the paper by that portion of the tube containing water, is blocked out by the meniscus, and is diffused by the empty portion. With the proper adjustment of the

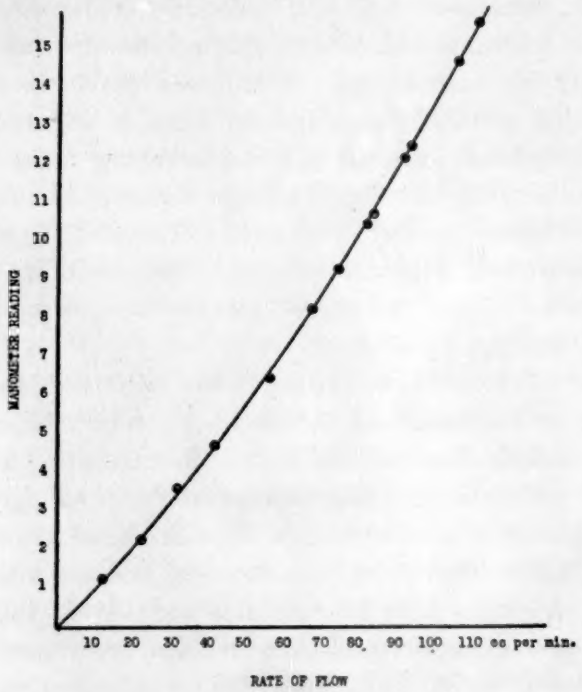

FIG. 1

light intensity this results in a record in which a light-gray area is separated from a black one by a white line.

By placing fine wires across the slit at points determined from the calibration curve, lines are traced on the record so that it may be read directly without referring to the curve. A signal magnet may be placed in front of the slit below the base line to indicate time and a tambour may be similarly arranged to record activity, although this has been found unnecessary since the record itself is a sensitive recorder of changes of activity. The arrangement of the apparatus is shown diagrammatically in Fig. 2. The size of the capillary is determined by the range of flow to be covered, and must be drawn out of thick-walled capillary tubing since there are no standard orifices fine enough available.

The animal is placed in the chamber and after testing for leaks is placed in the water bath and connected to the flowmeter. The input side of the flowmeter is connected to a large rubber bag containing oxygen under slightly greater than atmospheric pressure. The stopcock is opened to bypass the capillary while the apparatus comes to equilibrium and is then closed. As the oxygen is taken up by the animal and CO_2 is absorbed, the pressure in the chamber falls. This causes a difference of pressure across the capillary resulting in a flow of oxygen into the chamber. When

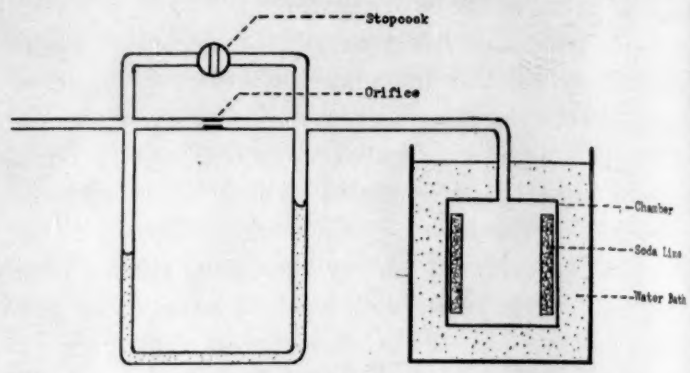

FIG. 2

this flow balances the uptake of the animal, the pressure remains stationary and the rate of flow as registered by the flowmeter gives the true rate of oxygen uptake of the animal. For this reason, the flowmeter record is only reliable where the rate is constant, since it will lag behind a rapidly increasing rate and give high readings while the rate is falling. However, this lag is very slight so that changes occurring over a period of a few minutes are fairly accurate and the direction and magnitude of changes can be told within a few seconds. The temperature of the jar must be controlled within a few degrees, although even large changes in temperature render the record inaccurate only during the period of change.

This apparatus has been used for mice, rats, guinea pigs, dogs and Macacus rhesus monkeys, giving basal values which check well with the available literature. It has given a clearer picture of the rapid changes due to activity and short-acting drugs than would have been possible with any other method.

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